

KOLOTYRKH, Ya.M.; MEDVEDYEVA, L.A.

Relation between the hydrogen overpotential on lead, cadmium, and thallium electrodes, and the sign of their surface charge in acid solutions. Zhur.Fiz.Khim. 25, 1355-64 '51. (MLRA 4:11)
(CA 47 no.17:8555 '53)

1. L.Ya.Karpov Phys.-Chem. Inst., Moscow.

KOLOTYRKIN, YA. M.

USSR/Chemistry - Cadmium

Sep 53

"Electrochemical Behavior of Cadmium Under Conditions of Its Spontaneous Dissolution in Aqueous Solutions of Electrolyte I. Effects of the Concentration of Acid and of the pH of the Solution at a Constant Total Concentration of the Electrolyte,"
Ya. M. Kolotyrkin, L. A. Medvedeva, Physicochem Inst im L. Ya. Karpov

Zhur Fiz Khim, Vol 27, No 9, pp 1344-1353

3 The electrochemical aspects of the dissolution of cadmium in acidic aqueous solns of electrolytes

269T26

have been clarified using the polarographic method for the determination of the concn of Cd ions.

KOLOTHYKIN, YA. M.

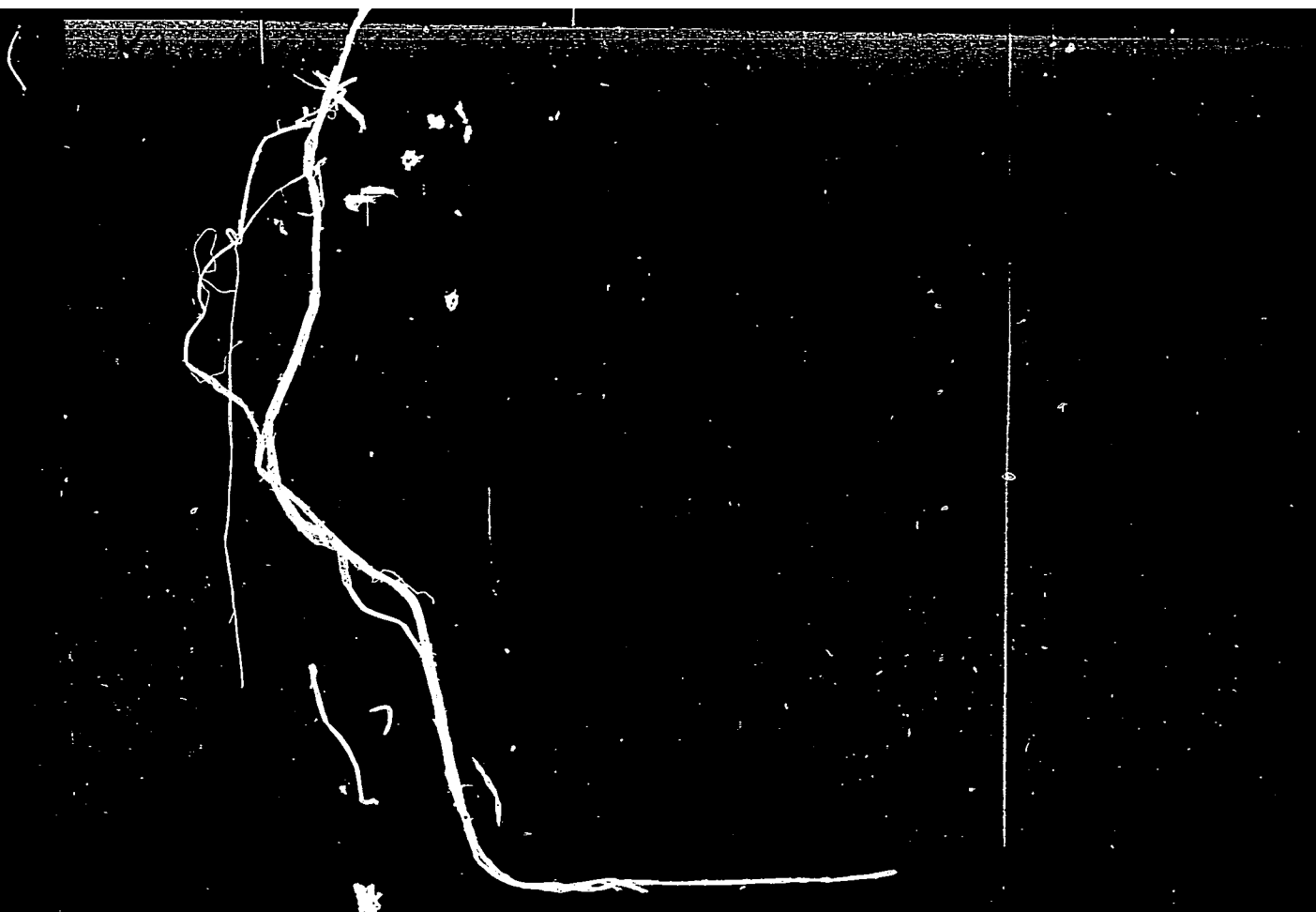
Physical Chemistry

Dissertation: "Kinematics and Mechanism of Dissolving of Metals in Acid Solutions of Electrolytes." Dr Chem Sci, Order of Labor Red Banner Sci Res Physicochemical Inst imeni L. Ya. Karpov, 29 Mar 54. (Vechnyaya Moskva, Moscow, 18 Mar 54)

SO: SUM 213, 20 Sept 1954

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CIA-RDP86-00513R000823930011-4



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CIA-RDP86-00513R000823930011-4"

KOLOTYRIN, Ya. M.

USSR/Chemistry - Physical chemistry

Card 1/2

Pub. 22 - 26/52

Authors : Bune, N. A., and Kolotykin, Ya. M.

Title : Effect of anion adsorption on the kinetics of hydrogen formation on a lead electrode

Periodical : Dok. AN SSSR 100/2, 295-298, Jan 11, 1955

Abstract : Investigation was made to determine the effect of the anion composition of a solution on the kinetics of hydrogen formation over a wide range of potentials and on the kinetics of supertension change with time. The authors also studied the effect of temperature on the rate of supertension drop during the transformation from the zone of high polarizations into low ones.

Institution : The L. Ya. Karpov Scient-Research Physico-Chemical Institute

Presented by: Academician V. A. Kargin, August 2, 1954

Periodical : Dok. AN SSSR 100/2, 295-298, Jan 11, 1955

Card 2/2 Pub. 22.- 26/52

Abstract : Results showed that the kinetics of H-formation as well as the kinetics of any other electrode reaction will experience essential changes as a result of the adsorption-chemical reaction between the surface atoms of the electrode metal and the anions of the solution. The polarization point at which the rate of electrode reaction becomes dependent upon the anion composition of the solution is determined by the zero charge point on the surface of the electrode metal. Seven USSR references (1939-1951). Table; graphs.

Resolution No. 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917,

give the principal corrosion characteristics of steel. Since the degree of passivation is a function of the potential, the

KOLOTYRKIN, Ya. M. (Prof.)

"Electrochemical Investigations of Metals."

report presented at Scientific Conference at the Inst. for Physical Chemistry
imeni L. Ya. Karpov, Acad. Sci. USSR, Nov 1957.

KOLOTYRKIN, Y. M.

Moscow

"Electro-Anodic Passivation of some Metals in Electrolytic Solutions"
a paper submitted to the International Symposium on the Passivity of Metals, 2-7
Sep 57, Darmstadt, Germany.

C-3,800,126

KOLOTYRKIN, Ya. M.

USSR/Physical Chemistry - Electrochemistry.

B-12'

Abs Jour: Referat. Zhurnal Khimiya, No 3, 1958, 7309.

Author : Ya. M. Kolotyrkin, P.S. Petrov.

Inst :

Title : Electrochemical Behavior of Titanium in Aqueous Electrolyte Solutions. I. Hydrogen Overtension on Titanium.

Orig Pub: Zh. fiz. khimii, 1957, 31, No 3, 659-672.

Abstract: The overtension (η) of hydrogen on a Ti cathode was studied in 0.01 to 10 n. H_2SO_4 , 1 and 6 n. HCl and in acidified and alkalinized K_2SO_4 solutions (general concentration 1 n.). The shape of the curves (η , $\log i$) depends on the rate of their measurement and on the preliminary treatment of the electrode. At rapid measurements after a prolonged cathode polarization at great i -s, the curves (η , $\log i$) in acid solutions and in alkaline K_2SO_4 ones follow the Tafel equation (the inclination factor is 0.100 to 0.140 v), and at $i = 1$ ma per sq.cm,

Card : 1/2

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KOLOTYRKIN, YA. M.

AUTHORS: Medvedeva, L.A., Kolotyarkin, Ya.M.

76-12-10/27

TITLE: The Adsorption of Iodine Ions on Lead Electrodes in Acid Solutions
(Adsorbtsiya ionov yoda na svintsovom elektrode v kislykh rastvorakh).

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 12, pp.2668-2675 (USSR)

ABSTRACT: It was stated in a series of works [Ref.1-7] that the electrolyte-anions which do not participate immediately at the electrolytic precipitation of hydrogen can exercise an essential influence on the velocity of this reaction due to the adsorption of these anions through the surface of the electrode metal. Measurements of iodine-ion-adsorption on a lead-electrode in acid solutions by applying the method of radioactive isotopes were carried out for clarifying this process. The following can be stated on the strength of these investigations: 1.) The iodine-ion adsorption was measured on spongy lead-electrodes in acid solutions ($1.0 \text{ N H}_2\text{SO}_4$) within the range of the KI -concentrations of from $1 \cdot 10^{-5}$ to $2 \cdot 10^{-3} \text{ N}$ in the potential interval of from -0.260 to -0.535 V by means of the radiometric methods. 2.) It is shown that an increase of KI -concentration in the mentioned ranges is accompanied by an increase of the filling up of the lead-surface with adsorbed iodine-ions in a quantity of from 0.37 to

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The Adsorption of Iodine Ions on Lead Electrodes in
Acid Solutions

76-12-10/27

0.38.5% of the monolayer. 3.) In the investigated range of polarization the value of adsorption is equally a linear function of the potential, in which case the displacement of the potential in the direction of the positive values is accompanied by an increase of the adsorption-value which is the greater, the greater is the KJ -concentration in the initial solution. 4.) It is shown that the iodine-ion adsorption on lead begins with noticeable negative charges of the surface of the electrode and that it is completely reversible. These results correspond to the data obtained from previous works. 5.) It was stated that, in dependence on the filling of the surface, the iodine-ion adsorption can produce both a decrease as well as an increase in hydrogen overpressure on the lead. Hence it follows that the influences of the adsorbed ions on the hydrogen overpressure can take place by two different ways: viz. by a change of the character of potential distribution in the surface layer, or by means of changing the energy of the $Me-H$ -bond. Such an assumption allows to explain the observed difference in the effect of the adsorbed ions on the kinetics of hydrogen-precipitation on various metals. There are 7 figures, 2 tables, and 19 references, 18 of which are Slavic.

Card 2/3

The Adsorption of Iodine Ions on Lead Electrodes in
Acid Solutions

76-12-10/27

ASSOCIATION: Physical-Chemical Institute imeni L.Ya. Karpov, Moscow (Fiziko-
khimicheskiy institut im. L.Ya.Karpova, Moskva).

SUBMITTED: August 7, 1956

AVAILABLE: Library of Congress

Card 3/3

AUTHORS: Knyazheva, V. M., Kolotyrkin, Ya. M. 20-117-6-35/54

TITLE: The Anodic Passivation of Chromium in Acid Solutions
(Anodnaya passivatsiya khroma v kislykh rastvorakh).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 114, Nr 6, pp. 1265-1268 (USSR)

ABSTRACT: In an earlier paper (reference 1) the authors proved that the curve which they obtained on the electrochemical reaction of chromium and nickel in a K_2SO_4 -solution by means of the potentiostatic method of polarization-measurements expresses the dependence of the stable speed on the potential. It permits the determination of the polarization boundaries of the domain of passivation as well as of the corrosion losses in this domain. Thus this curve represents a very important corrosion-characteristic of the metal. In the present paper the electrochemical behavior of pure chromium in its anodic passivation in solutions of sulfuric acid (1,0; 0,10 and 0,01 n) was potentiostatically investigated. The dependence of the steady velocity of solution on the potential. For the 1,0 n-solution of H_2SO_4 this dependence is expressed by the curve ABCDE (figure 1). At potentials which more negative

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than -0,350 V the velocity of solution increases according to the usual Tafelian straight with an inclination of 0,07. At potentials between -0,350 and 0,00 (section BC) the steady velocity of solution decreases according to the same straight, but with an inclination of inverse sign. In the domain further positive than 0,0 and further negative than 1,10 V (section CD) the velocity of solution remains constant. A rapid shift of the potential in the direction to positive values is also in this domain accompanied by an acceleration of the solution. Farther than 1,10 V (section DE) a overpassivation of chromium takes place. Figure 1 shows that on a further increase in potential the velocity of solution increases according to the Tafelian straight with an inclination of 0,04. Table 1 shows that the calculated values of the potential are practically in agreement with the test results. This shows that during the solution of chromium in the domain of overpassivation

Cr^{3+} and $Cr_2O_7^{2-}$

ions simultaneously develop at a ratio which rapidly leads to an equilibrium between these ions. The influence of the pH of the solution. The dependence of the velocity of solution of

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20-114-6-35/54

kilogram-calories. The anodic passivation of chromium is not connected with the formation of a phase film at its surface, but represents a consequence of the kinetic inhibition of the anodic reaction. This inhibition is produced due to the modification of the state of the metal surface in connection with time and potential, this modification being produced by the adsorption-chemical interaction of this surface with the oxygen of water (reference 1). This conclusion is in agreement with the results of the present work (figure 4). Therefore the polarizability of chromium and thus also the dependence of the speed of solution on the potential in the domain of passivation remain the same as in active state.

There are 4 figures, 1 table, and 6 references,
4 of which are Slavic.

Card 4/5

KOLOTYRKIN, Y. M.

PROSKURNIN, M. A., KOLOTYRKIN, Y. M., and PSHEZHETSKIY, S. Y.

"Investigations into Radiation Chemistry of Aqueous Solutions and Some ~~EM~~
Other Inorganic Systems."

paper to be presented at 2nd UN Intl. Conf. on the peaceful uses of Atomic
Energy, Geneva, 1 - 13 Sept 1958.

KOLOTYRKI', Ya.M.

anodic passivation of metals. Probl.fiz.khim. no.1:81-93
'58. (MIRA 15:11)

1. Laboratoriya elektrokhemii i korrozii metallov
Nauchno-issledovatel'skogo fiziko-khimicheskogo instituta
im. Karpova.

(Passivation)

KOLOTYRKIN, Ya.M., prof.; FLORIANOVICH, G.M., kand.khim.nauk

Passivation of metals. Khim. nauka i prom. 3 no.4:483-491 '58.
(MIRA 11:10)

(Electrolytic corrosion) (Passivity (Chemistry))

5(4)

AUTHORS:

Bune, N. Ya., Kalotyrkin, Ya. M.,
Tyurikov, G. S.

SOV/76-32-12-4/32

TITLE:

The Electrochemical and Corrosion Behaviour of Steel and Nickel Electrodes in Sulfuric Acid Solutions Subjected to the Action of γ -Rays (Elektrokhimicheskoye i korrozionnoye povedeniye stal'nogo i nikelovogo elektrodov v rastvorakh sernoy kisloty, podvergayushchikhsya vozdeystviyu γ -izlucheniya)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 12,
pp 2679 - 2685 (USSR)

ABSTRACT:

γ -rays effect a dissociation of water, thereby forming molecules with redox properties. Investigations were made of type 18 - 8 steel and spectrally pure nickel in 1N H_2SO_4 at a Co^{60} γ -radiation period of several hours at an intensity of $1.5 \cdot 10^{15}$ eV/ml.sec. Without radiation the air-oxidized steel anode had a static potential close to that of the reversible hydrogen electrode. With the electrode remaining in the acid for some time, a partial polarization caused the potential to shift towards negative values. In all cases

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The Electrochemical and Corrosion Behaviour of Steel and Nickel Electrodes in Sulfuric Acid Solutions Subjected to the Action of γ -Rays SOV/76-32-12-4/32

radiation caused the potential to shift in the positive direction, parallel with the stage of activation of the electrodes.

A comparison with the charge-curves of polarized, activated or air-oxidized steel electrodes in non-irradiated sulfuric acid solution shows that the effect of γ -radiation is equivalent to a polarization by an anode current of $5 \cdot 10^{-7}$ to $1 \cdot 10^{-5}$ A/cm². In the case of nickel electrodes, radiation also results in a shifting of the potential in the positive direction. No polarization is caused here since the amperages obtained through radiolysis are too weak by several orders of magnitude. When radiation is stopped, the nickel potential soon returns to the initial value whereas it almost retains its value with steel. This shows that more stable oxidizing agents (corrosion products) form in the irradiated solution in the presence of steel. To test the foregoing steel electrodes were irradiated in sulfuric acid in the presence of Fe⁺⁺ ions. In this case the positive potential shifting also ensued. Since Fe⁺⁺ ions are not oxidizing agents they must have been oxidized by the γ -rays

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The Electrochemical and Corrosion Behaviour of Steel and Nickel Electrodes in Sulfuric Acid Solutions Subjected to the Action of γ -Rays SOV/76-32-12-4/32

to form Fe⁺⁺ ions. The oxidizing agents forming by dissociation under radiation do not differ as to their effect from trivalent iron. Soon after the beginning of radiation platinum assumes (as Ts. I. Zalkind and V. I. Veselovskiy also stated, Ref 8) a value in the vicinity of the potential of the reversible H-electrode. In the iron-ion a shifting of the potential towards negative values is noticeable immediately after the beginning of the radiation, but the potential soon shifts in the positive direction. The potential of Pt, however, remains more negative than that of steel. With irreversible redox processes on electrode surfaces a more negative potential is to be found with metals with low hydrogen- and high oxygen hypertension than with metals with high hydrogen- and low oxygen hypertension. There are 5 figures and 8 references, 4 of which are Soviet.

Card 3/4

AUTHORS: Florianovich, G. M., Kolotyrkin, Ya. M., Smirnova, N. K. SCV/20-120-4-43/67

TITLE: The Influence of Nickel Upon the Electrochemical and Corrosion Behavior of Steel (Vliyaniye nikelya na elektrokhimicheskoye i korroziionnoye povedeniye stali)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, No 4, pp. 845 - 848 (USSR)

ABSTRACT: In this paper the influence exercised by nickel on the behavior of steel in the domain of passivation is investigated by means of the potentiostatic method of measuring polarization curves; the experiments were carried out with steels of the types Kh22T, Kh 22N14T and Kh 2CN6ST. Measurements were carried out at 20° in a 0,1 n-solution of H₂SO₄ in a nitrogen atmosphere. The velocity of the dissolution of steel Kh22T depends on the potential in rather a complicated way. The behavior of steel at different potentials is described in short. The minimum velocity of steel dissolution is within the potential range of from 0 to 0,500 V. Also the other types of steel investigated showed similar dependence of dissolution velocity on the

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The Influence of Nickel Upon the Electrochemical and
Corrosion Behavior of Steel

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potential. The addition of nickel decreases the dissolution velocity in all potentials that are more negative than + 1,200 V. The velocity of dissolution systematically decreases within the range of passivation in the case of an increase of the nickel percentage in steel. The addition of nickel has almost no influence upon the position of the curve which characterizes the over voltage of hydrogen. To convert steel into the passive state and thus also to increase its resistance to corrosion the stationary potential in the case of absent external polarization must be shifted towards the positive side, up to values which are more passive than the passivation potential. Such a shift can be brought about by the increase of the over voltage of the anodic reaction and also by increase of the total velocity of the depolarizing cathodic reactions. The authors decreased the over voltage of hydrogen by facing a small quantity of platinum upon the steel surface. Similar results were obtained by introducing atmospheric oxygen into the solution. The degree of passivation of the surface of a steel with given composition is a function of the potential and in the cases described does not depend on the method of maintaining this potential. A shift

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The Influence of Nickel Upon the Electrochemical and
Corrosion Behavior of Steel

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of the potential by a change in the chemical composition of the steel can considerably change the degree of its passivation with a given potential. In conclusion, the authors thank A.A.Babakov for having placed the steel samples at their disposal. There are 1 figure, 1 table, and 4 references, 3 of which are Soviet.

PRESENTED: January 10, 1958, by A.N.Frunkin, Member, Academy of Sciences, USSR

SUBMITTED: October 9, 1957

1. Steel--Corrosion
2. Steel--Electrochemistry
3. Steel--Passivity
4. Nickel--Electrochemistry

Card 3/3

Moscow, Fiziko-Khimicheskiy Institut

Problemy fizicheskoy khimii; trudy, vyp. 2 (Problems in Physical Chemistry; Transactions of the Institute, no. 2). Moscow, Oostkhimizdat, 1959. 202 p. 1,000 copies printed.

Editorial Board: Ya. M. Varnavskiy, Doctor of Chemical Sciences; G. S. Zhitov, Doctor of Chemical Sciences; V. A. Kargin, Academician; Ya. M. Polovinkin, Doctor of Chemical Sciences (Resp. Ed.); S. S. Medvedev, Academician; S. Ye. Frenkel'skiy, Doctor of Chemical Sciences; V. M. Cherednichenko, Candidate of Chemical Sciences; V. S. Chesalova (Editorial Secretary), Candidate of Chemical Sciences; Ed.: I. A. Myasnikov; Tech. Ed.: Ye. G. Shpak.

PURPOSE: This collection of articles is intended for physical chemists.

COVERAGE: The collection is the second issue of the Transactions of the Scientific Research Institute of Physical Chemistry named L. Ya. Zaitsev. It contains 17 articles which review Card 1/5

- Tsvetkov, M. I., M. K. Morozov, V. M. Fysher (Deceased), and I. A. Lukyanova, and V. A. Danilovich. The Catalytic Action of Ammonia Over a Nonplatinum Catalyst 16
- Fabzheval'skiy, S. Ya., S. A. Kuznetsov, Ya. I. Gribova, A. V. Pankratov, N. M. Kozlov, Ya. M. Popelova, A. Ya. Apis, Y. M. Strutsin, N. A. Rindskopf, and V. M. Cherednichenko. Kinetics of Decomposition, and the Explosion of Oxides 27
- Horiuchi, Juro (Japan). How to Find the Kinetic Equation of a Reversible Reaction 39
- Kolotyrskiy, Ya. M. The Effect of the Specific Adsorption of Adsorbates on the Kinetics of Hydrogen Evolution and the Structure of the Metal-Solution Boundary 50
- Varnavskiy, Ya. M. The Nature and Mechanism of Electro-Physis 61
- Zvonkova, Z. V. Crystallochemical Data on the Nature of the Mutual Effect of Atoms 97
- Romantsov, G. I. Investigation of the Effect of Inter-molecular Interactions on the Ultraviolet Absorption Spectra of Aromatic Compounds 107
- Sandina, Ye. I., V. J. Kutsev and G. P. Ormont. Investigation of Equilibrium in the System Zirconium-Hydrogen at High Temperatures and the Dependence of the Free Energy of ZrH_2 Formation on its Composition and Structure 118
- Proctor, A. D., M. A. Dambrevskiy, L. A. Daitlyayev, L. A. Junina, and Ya. M. Kuznetsov. Study of the Mechanism of Discharge from a Cylindrical Electrode with C_6H_6 as a Power-ful Source of γ Radiation 132
- Kabanov, N. K., B. G. Vasil'yev and N. M. Tuntitskiy. Study of the Conformational Transformation of n-Octane and n-Nonane Molecules by the Method of Bombardment With "quasi-Radiation" Electrons 146
- Baberman, A. J. Radiation-Chemical Effects in Solid Inorganic Salts 163
- Makarov, M. P., A. V. Zaitse, and R. V. Zhuravskiy. Radiation-Chemical Chlorination of Benzene 169
- Prokhorov, M. A., Ye. V. Barabko, and L. I. Kartalova. Course of the Process of Benzene Oxidation in an Aqueous Solution Under the Action of Radiation 177
- Kisela, J. (Czechoslovakia), Ye. V. Barabko, L. I. Kartalova, and M. A. Prokhorov. Composition, Products of Phenol Formed During the Radiolysis of Benzene in an Aqueous Solution 181
- Shapovalov, V. A., and G. A. Gol'der. The Problem of the Phase Composition of the System $H_2O-NaNO_3-KNO_3$ at Low Temperatures 189
- Orekhov, V. D., and A. A. Zaslavskiy. Sensitization of the Radiolytic Oxidation of α -Naphthol Dye 191

Kolotyrskiy, Ya. M.

NOTIFICATION OF THE 1985/86
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2d, Geneva, 1958.

booklety sovetskikh uchenykh. (t. 4) Ezikiya radionukleov i radiatsionnykh prevrashcheniy (Reports of Soviet Scientists. v. 4: Chemistry of Radioelements and Radiation Transformations) Moscow, Atomizdat, 1959. 325 p. 8,000 copies printed. (Series: Its: Truth)

Ed. (title page): A. P. Vinogradov, Academician; Ed.: V. I. Labarev; Tech. Ed.: Ye. I. Masel'.

PURPOSE: This collection of articles is intended for scientists and engineers interested in the applications of radioactive materials in science and industry.

CONTENTS: The book contains 26 separate studies concerning various aspects of the chemistry of certain radioactive elements and the processes of radiation effect on matter. These reports discuss present-day problems of supposing irradiated nuclear fuel, research in the chemistry of cesium, thorium, uranium, plutonium, and americium, problems related to the synthesis and burning of radioactive wastes, the radiolysis of aqueous solutions and of organic compounds, the mechanism of polymer chain grafting, and the effect of radiation on natural and synthetic rubbers. V. M. Prusakov edited the present volume. Most of the reports are accompanied by references. Contributors to individual investigations are mentioned in annotations to the Table of Contents.

L. S. Bortman, L. V. Ilyin, Y. V. Fedin, and M. K. Melnikova, I. P. L.
In Solar Production and Properties of Several Binary Fluidless of
Production (Secret No. 2208)

laborer, G. H., and Y. H. Enaynor. Investigations on the Chemistry of
Ammonium Chloride (Report No. 2127)
[B. G. Corbaho-Germanor is mentioned as having supplied the material
for the second section of this study.]

**KRYGENTZ, O. Ye., V. D. Nikol'skiy, S. M. Starostin, A. Kurtsayev, and
V. I. Smid't.** Contribution to the Chemistry of Radioactive Ruthenium
(Report No. 214)

Boitern, V. I., V. D. Polukhin, A. P. Kuznetsov, V. V. Orlov, P. M. Obyedkov, N. M. Petrov, and G. V. Zhelezov. Study of the Migration of Emigrative Elements in Galls (Report No. 2297)

Wormsensitivity, S. A., G. A. Gerds, P. P. Delaney, and L. I. Baskett,
Determination of Low-Salt-Content and Low-Activity Waste Waters From
Biotechnical Plants (Report No. 2024)

Pol'shakov, K. A., A. T. Avdonin, V. T. Borichev, I. V. Ruzensky, and others, Experimental Industrial Plant for Purification of Laboratory Wastewater Contaminated with Ineffective Elements (Report No. 202).

Emirov, V. G., and Ye. M. Krupa. On the Possibility of Purifying Radioactive Waste waters Contaminated with radioactive elements (preliminary report). Proc. USSR Acad. Sci. Div. Chem. Sci. USSR, 1958, No. 2058.

Prochurnin, M. A.;
M. Ya. M. Golobrykin. Investigations Into the
Role of the Methyl Group in the Reactions of
Alkyl Halides (Part 2). 2022

The investigations were carried out at the Laboratory of Radiation Chemistry of the Physicochemical Institute of the USSR Academy of Sciences, Leningrad, U.S.S.R.

[illegible]

Path, H. A., V. I. Medvedevskiy, and V. V. Sharava. Radiolysis and Oxidation of Organic Compounds (Report No. 229)
(The following are mentioned: H. A. Bolosova and V. I. Feurlov,

KOLOTYRKYIN YA. M.
KALASHOV

PHASE I BOOK EXPLOITATION 507/1216

5(4)

Sveshchaniye po elektrokhemii. 4th, Moscow, 1956.

Trudy... (Transactions of the Fourth Conference on Electrochemistry; Collection of Articles) Moscow, Izdatvo AN SSSR, 1959. 868 p. Errata slip inserted. 2,500 copies printed. Sponsoring Agency: Akademiya nauk SSSR. Otdeleniye khimicheskikh nauk.

Editorial Board: A.M. Frumkin (Resp. Ed.), Academician, O.A. Yezin, Professor, S.I. Zhdanov (Resp. Secretary), B.M. Kabanov, Professor, S.I. Zhdanov (Resp. Secretary), B.M. Kabanov, Professor, P.D. Yezin, S.I. Zhdanov, Doctor of Chemical Sciences; V.V. Kostikov, Y.M. Kolotyrykin, Doctor of Chemical Sciences; V.V. Kostikov, Professor; L.K. Kuznetsov, Professor; Z.M. Spolov'nyy, V.V. Stander, Professor; and O.M. Florianovich, M. of Publishing House M.D. Tegorovi; Tech. Ed.: T.A. Prusakov.

PURPOSE: This book is intended for chemical and electrical engineers, physicists, metallurgists and researchers interested in the theory and practice of electrochemistry.

CONTENTS: The book contains 127 of the 138 reports presented at the Fourth Conference on Electrochemistry sponsored by the Department of Chemical Sciences and the Institute of Physical Chemistry, Academy of Sciences, USSR. The collection contains papers on different branches of electrochemical kinetics, double layer theories and galvanic processes in metal electrodeposition and industrial electrolysis. Abridged discussions are given at the end of each division. The majority of articles are not included here have been published in periodical literature. No personalities are mentioned. References are given at the end of most of the articles.

Khan, O.A., K.I. Hukova, V.A. Kurnatova, and A. Ya. Enkhunov. Production of High-Purity Zinc by the Method of Electrolytic Purification 558

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KOLOTYRKIN, Ya. M.

"Effect of Specific Adsorption of Anions of the Kinetics of Anodic Dissolution of Some Metals"

report to be submitted for the Session of the Theoretical Division of the Electrochemical Society - Spring Meeting, Philadelphia, 4-7 May 1959.
Abst. available E,3,128,664

Karpov Institute for Physical Chemistry, Moscow

KOLOTYRKHIN, Ya.M.

Effect of the specific adsorption of anions on the kinetics of hydrogen evolution and the structure of the metal - solution boundary. Probl.fiz.khim. no.2:50-60 '59. (MIRA 13:7)

1. Laboratoriya korrozii i elektrokhemii metallov Nauchno-issledovatel'skogo fiziko-khimicheskogo instituta imeni L.Ya.Karpova.
(Hydrogen) (Electromotive force)

31547
S/081/61/000/022/010/076
B102/B108

5 4700
AUTHOR:

Kolotyrkin, Ya. M.

TITLE:

The mechanism of anodic dissolution of metals under passivation conditions

PERIODICAL:

Referativnyy zhurnal. Khimiya, no. 22, 1961, 66, abstract 22B468 (Izv. Kazansk. fil. AN SSSR. Ser. khim. n. no. 5, 1959, 9-22)

TEXT: The electrochemical behavior of various metals and their dissolution mechanism are discussed for a wide range of polarizations corresponding to the variation of the electrode potential in electropolishing (EP). The influence of adsorption-activated oxygen and anions on the energy characteristics of the transition of a metal ion into solution is studied in detail. It was found to be a necessary condition for EP that the region of the second potential jump which occurs before separation of O_2 be reached. Current density in this region is virtually independent of the nature of the metal, and in $1N H_2SO_4$ it is $3-5 \cdot 10^{-3} \text{ a/cm}^2$. It is assumed that under these conditions the process of

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B102/B108

The mechanism of anodic ...

EP may be limited by the rate of water molecule diffusion to the electrode surface which will lead to its smoothening. EP is observed also when during dissolution complex metal ions are formed together with one of the electrolyte anions. [Abstracter's note: Complete translation.]

Card 2/2

5(4)

SOV/69-21-4-4/22

AUTHOR: Vasserman, P.I., Kolotyркиn, Ya.M., Chebotarevskiy, V.V.,
Feoktistova, A.A. ~~(MOSCOW)~~

TITLE: The Properties of Paint and Lacquer Coatings as Character-
ized by Their Electrical Resistance and Capacitance

PERIODICAL: Kolloidnyy zhurnal, Vol XXI, 1959, Nr 4, pp 392-397, (USSR)

ABSTRACT: The authors report on experiments intended to characterize
the structure and moisture-proof properties of certain metal
coatings by their electrical resistance and capacitance. The
measuring of the electrical resistance was carried out with an
alternating-current bridge, the scheme of which is illustra-
ted in figure 1 (diagram). The coating materials (perchloro-
vinyl, nitrocellulose, butylmetacrylate, ethylcellulose) were
in the form of thin films (30 - 35 μ) on metal, and in a free
state. The way they were used during the experiments is
likewise illustrated in figure 1. Figure 2 (graph) shows
measuring results concerning the resistance of a nitrocellu-
lose film and the capacitance of the system: platinum electrode-

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SOV/69-21-4-4/22

The Properties of Paint and Lacquer Coatings as Characterized by Their Electrical Resistance and Capacitance.

solution-film-solution-platinum electrode. The results were obtained at a frequency of 1 kilocycle after various time intervals. Previously the film had been immersed into an NaCl solution. The results show that after initially high values, the electric resistance of the film weakens due to a growing liquid absorption, whereas the capacitance of the system is on the increase. Experiments with the above-mentioned materials were carried out to ascertain the dependence of resistance and capacitance on the nature of the film-forming substance. The results are listed in a special table. Figure 3 (graph) shows the effect of alternating current frequency on the electrical resistance of coating films. In most cases the resistance weakens in inverse proportion to the increase of frequency. Film structure, however, exercises a considerable effect on this dependence. The resistance of less compact films weakens to a lower degree than the resis-

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SOV/69-21-4-4/22

The Properties of Paint and Lacquer Coatings as Characterized by Their Electrical Resistance and Capacitance.

tance of compact films. Figure 4 (graph) shows that the effect of frequency on electric resistance grows weaker in proportion to the growth of liquid absorption by the film. Figures 5 and 6 show the effect of electrolytes on the electrical resistance of a film and the capacitance of the system (ethylcellulose film in both cases). The resistance and capacitance values are lower in distilled water than in an NaCl solution. Discussing the results of their investigation the authors conclude that the establishment of a direct correlation between electrolyte concentration and film structure on the one hand and electric conductivity of the film on the other hand is not admissible. A comparison of the data obtained in NaCl solution and in distilled water shows that such a direct correlation does not exist even at the time of the immersion of the film into the liquid. The authors assume that the so-called surface conductivity plays an important role in the conductivity of the films. In this case

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The Properties of Paint and Lacquer Coatings as Characterized by Their Electrical Resistance and Capacitance

the total conductivity of the film immediately after immersion can be determined by two components: $K_{\Sigma} = K_1 + K_2$. K_1 is the electric conductivity of the electrolyte in the pores, and K_2 the pore surface conductivity. According to the investigations of I.I. Zhukov and other scientists, the specific weight of surface conductivity in the total conductivity of the film considerably increases at a reduction in pore dimension and a lowering of electrolyte concentration. In dependence on the swelling of the film in the electrolyte, a third component appears, which is due to the conductivity of the film body. In case the equation will have the form $K_{\Sigma} = K_1 + K_2 + K_m$. K_m is the conductivity of the film body. The results of the investigation can be summarized as follows: a relation between the electric resistance, the vapor permeability and the lyophilic properties of metal coatings has been established. Films with low vapor permeability which swell badly in water

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SOV/69-21-4-4/22

The Properties of Paint and Lacquer Coatings as Characterized by Their Electrical Resistance and Capacitance.

are characterized by high electric resistance. The electric conductivity of a coating film is of three components: conductivity of the electrolyte in the pores, surface conductivity in the pores and conductivity of the film body. The conductivity of a film depends on the alternating-current frequency, which, evidently, is due to a change in the surface conductivity in the film pores. There are 5 graphs, 1 diagram, 1 table and 10 references, 4 of which are English, 3 Soviet and 3 German.

SUBMITTED: 7 February, 1958.

Card 5/5

KOLOTYRKIN, Yakov M.

"Influence of anions on the dissolution kinetics of metals."

report to be submitted at Gordon Research Conferences - New London, New Hampton, and Meriden, N.H., 13-June-2 Sep 60.

Physico-Chemical Institute im L. Ya. Karpov, Moscow.

KOLOTYRKIN, Ya. M., BUNE, N. Ya., FLORIANOVICH, G. M., Moskva:

"The Mechanism Action Of Oxydizing Agents As Corrosion Inhibitors Of Nickel And Stainless Steel".

report submitted for the European Symposium on Corrosion Inhibitors, Ferrara Italy, 29 Sep-1 Oct 1960.

KOLOTYR KIN, Ya. M.

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PHASE I BOOK EXPLOITATION

SOV/5256

Gerasimov, Valentin Vladimirovich, ed., Candidate of Chemical Sciences.

Korroziya reaktornykh materialov; sbornik statey (Corrosion of Nuclear-Reactor Materials; a Collection of Articles) Moscow, Atomizdat, 1960. 284 p. 3,700 copies printed.

Ed.: A.I. Zavodchikova; Tech. Ed.: Ye.I. Mazel'.

PURPOSE: This collection of articles is intended for mechanical and metallurgical engineers as well as for scientific research workers concerned with the construction of nuclear reactors.

COVERAGE: The water corrosion of various types of stainless steel and alloys under high pressures and temperatures is investigated from the point of view of the use of these materials for the construction of nuclear reactors. Attention is given to the following: the use of oxygen for protecting steel against corrosion, the behavior of steel in high-temperature

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Corrosion of Nuclear- (Cont.)

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water with various compositions, factors of metal stress corrosion, intergranular corrosion, the mechanism of corrosion cracking, and the corrosion resistance of aluminum and zirconium alloys. Conclusions based on test results are included. No personalities are mentioned. Most of the articles are accompanied by references. Of 238 references 97 are Soviet.

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AND ELECTROCHEMICAL CORROSION AT
HIGH TEMPERATURES AND PRESSURES

5

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Card 2/4

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SOV/5256

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5

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Kolotyrkin, Ya. M., G. M. Florianovich, P. S. Petrov, N. K. Smirnova, and L. M. Vyazankin. On the Application of Oxygen for Protecting Steel Against Water Corrosion at High Temperatures

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Gerasimov, V. V., and A. I. Gromova. Effect of the Composition

Card 3/9

NITSBERG, L.V.; YAKUBOVICH, S.V.; KOLOTYRKIN, Ya.M.

Electrochemical investigations of the protective properties of
lacquer paint materials and coatings on steel in an electrolyte
medium. Lakokras.mat. i ikh prim. no.1:17-23 '60. (MIRA 14:4)
(Protective coatings)

S/030/60/000/009/016/016
B021/B056

AUTHORS: Kolotyrkin, Ya. M., Novakovskiy, V. M.

TITLE: The Theory of Corrosion and Protection of Metals

PERIODICAL: Vestnik Akademii nauk SSSR, 1960, No. 9, pp. 130 - 133

TEXT: The authors review N. D. Tomashov's book: *Tecriya korrozii metallov. Akademiya nauk SSSR (Academy of Sciences USSR). Institut fizicheskoy khimii (Institute of Physical Chemistry). Izdaniye AN SSSR (Publishing House of the AS USSR) 1959. Edition: 4,000 copies; volume: 590 pages; price: 35 rubles 70 kopecks. The book consists of four parts, of which the first two deal with the theory of chemical and electro-chemical corrosion processes. In the third and fourth part, the resistance to corrosion of technical metals and alloys is investigated. The last two parts are described as being carefully worked out, whereas the first two contain many mistakes and inaccuracies which are enumerated. In this, the reviewers refer to publications by A. N. Frumkin and K. F. Bongofer, and their collaborators. The third and fourth parts of the book, which deal with practical problems, are described as valuable. The first two parts,*

Card 1/2

KOLOTYRKIN, Ya.M. (Moskva)

Behavior of the electrode potential in the transition of the
electrode from the passive to the active state. Zhur.fiz.khim.
34 no.5:1121-1130 My '60. (MIRA 13:7)

1. Fiziko-khimicheskiy institut im. L.Ya. Karpova.
(Electrodes) (Passivation) (Electromotive force)

18.8300

67946

5(4)

AUTHORS:

Florianovich, G. M., Kolotyrkin, Ya. M. BG04/B011

S/020/60/130/03/028/065

TITLE:

Influence of the Chromium Content on the Electrochemical and Corrosive Behavior of Iron-Chromium Alloys

PERIODICAL:

Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 3, pp 585-588 (USSR)

ABSTRACT:

The investigations conducted in the authors' laboratory (Ref 6) showed that the potentiostatic method allows an objective evaluation of the electrochemical and corrosive behavior of metal alloys. This allows the evaluation of the anticorrosive behavior at different potentials and different (active, passive) surface states. In the present paper the authors used the above method to investigate the behavior of Fe-Cr alloys in 0.1 N H₂SO₄ in nitrogen atmosphere. The desired potential was kept constant by means of an electronic potentiostat. The concentration of the corrosion products was determined colorimetrically, in some cases also gravimetrically. The authors investigated pure Armco- and Hilger iron, alloys prepared from Armco-Fe with pure Cr (0.1-35% Cr) and alloys

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Influence of the Chromium Content on the
Electrochemical and Corrosive Behavior of Iron -
Chromium Alloys

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B004/B011

of the types ¹⁸12Kh6, ¹⁸1Kh13, ¹⁶Kh17, ¹⁶Kh28, containing up to 0.4% Ni in addition to Cr. The results are graphically given in figures 1,2. The curves reveal several sections depending on the potential: active dissolution, first limiting current, passivation, overpassivation, second limiting current, new activation. The authors found the following: the dissolution rate of pure passive Fe is lower by only one order of magnitude than its dissolution rate with limiting current. Alloys with up to 4% Cr are not passivated. Alloys with 4 - 13% Cr exhibit no passivation and no second limiting current. In alloys with more than 13% Cr there occurs no first limiting current. Their dissolution rate in the passive state is lower by three orders of magnitude than that of alloys with less than 13% Cr. In the potential section of the second limiting current and of the active dissolution, however, there occurs a rapid dissolution in the case of a Cr content rising above 13% (Table 1). These results do not agree with the data contained in references 7,8, but are confirmed by data offered by A. M. Sukhotin and E. I.

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Influence of the Chromium Content on the
Electrochemical and Corrosive Behavior of Iron -
Chromium Alloys

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B004/B011

Antonovskaya (Ref 10) and M. Pražek (Ref 11). It follows that the composition of an alloy is by no means a clear sign of its corrosive behavior, but the dissolution rate is a factor of the potential. The authors thank L. A. Vanyukova and A. A. Babakov for the alloys supplied and for their advice. There are 2 figures, 1 table, and 11 references, 4 of which are Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-khimicheskiy institut im.
L. Ya. Karpova (Scientific Research Institute of Physical
Chemistry imeni L. Ya. Karpov)

PRESENTED: October 1, 1959 by A. N. Frumkin, Academician

SUBMITTED: September 24, 1959

Card 3/3

KOLOTYRKIN, Ya.M.; CHEMODANOV, A.N.

Overvoltage of hydrogen on platinum. Dokl.AN SSSR 134 no.1:
128-131 S '60. (MIRA 13:8)

1. Fiziko-khimicheskiy institut im. L.Ia. Karpova. Predstavleno
akad. A.N. Frumkinym.
(Hydrogen) (Overvoltage) (Platinum)

S/081/61/000/021/088/094
B107/B147

AUTHORS: Nitsberg, L. V., Yakubovich, S. V., Kolotyrkin, Ya. M.

TITLE: Determination of the optimum content of passivating pigments in dyes, and of the effective thickness of protective coatings by electrochemical methods

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 21, 1961, 460 abstract
21P144 (Lakokrasochn. materialy i ikh primeneniye, no. 1, 1961, 13-18)

TEXT: The authors searched for faster test methods to shorten the time required for elaborating formulas for such dyes. They studied the suitability of electrochemical methods for determining the optimum content of passivating pigment in the dye and the effective thickness of protective layers. The following methods were applied: determination of the electric resistance of the coating, and determination of the potential of the varnished metal. These methods proved to be fully applicable. The authors investigated model dyes on drying oil with a mixture of potassium chromate - barium chromate, zinc yellow, zinc oxide, red lead and iron
Card 1/2

1.1800

26343
S/076/61/035/007/014/019
B132/B220

AUTHORS: Bune, N. Ya., and Kolotyrkin, Ya. M.

TITLE: Electrochemical behavior of nickel in sulfuric acid in the presence of various oxidizers

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 7, 1961, 1543-1550

TEXT: Electrochemical and corrosion behavior of nickel in sulfuric acid were studied in the presence of $\text{Fe}_2(\text{SO}_4)_3$, or $\text{Ce}(\text{SO}_4)_2$, or KMnO_4 , or $\text{K}_2\text{Cr}_2\text{O}_7$, or H_2O_2 , or molecular oxygen, respectively. The device used consisted of four cells with primary and auxiliary electrodes, reference electrode, and additional electrodes for purifying the solution before testing. Tests and mixing of solutions were performed in nitrogen atmosphere. At first, the dissolution rate increases linearly with increasing logarithm of the concentration of oxidizers until a critical concentration $c_c (\sim 0.01 \cdot \text{g} \cdot \text{equ}/\text{l})$ is reached. A critical potential $\varphi_{c4} (+0.120 \text{ v})$ and a critical dissolution rate $v_c (\sim 6 \cdot 10^{-3} \cdot \text{g}/\text{cm}^2 \text{ hour})$

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Electrochemical behavior of nickel in ...

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correspond to this critical concentration. If the concentration is further increased ($c > c_c$), the dissolution rate decreases, and the electrode potential is shifted to higher positive values. When the participation of molecules and ions of the oxidizer in the formation of the passivating layer was studied, it was found that they shifted the electrode potential to positive values due to their reduction on the metal surface. The passivation of the metal is effected by adsorption-chemical interaction between the surface atoms of the metal and the oxygen of the water. The nature of interaction and the stability of the layer formed are functions of the electrode potential. The curves for the potential variation with and without polarization of the Ni electrode have the same form and the same number of flattenings for the same potential intervals (0.120-0.160 v and 0.260-0.360v) (Fig. 5), i. e., there exists, in principle, no difference between anodic and chemical passivation. When studying the corrosion behavior of metals in solutions of oxidizers at potentials exceeding the passivation potential to the positive side, the corresponding reversible redox potential of the system, the exchange current i_0 at this potential, and the interdependence between reduction rate of the oxidizer and electrode

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Electrochemical behavior of nickel in ...

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potential have to be taken into account. The exchange currents observed are similar in the systems $\text{Fe}^{3+}|\text{Fe}^{2+}$ and $\text{Ce}^{4+}|\text{Ce}^{3+}$. In the former system, the electrode potential of nickel is practically analogous to that of platinum in such a solution, whereas the platinum has a much more negative potential in the latter system. The most effective oxidizers are those, in the presence of which the electrode potential of the coated metal attains values in the range of maximum passivation of the metal surface, thus, where the metal dissolution proceeds at a minimum rate. There are 6 figures, 1 table, and 15 references: 5 Soviet-bloc and 10 non-Soviet-bloc.

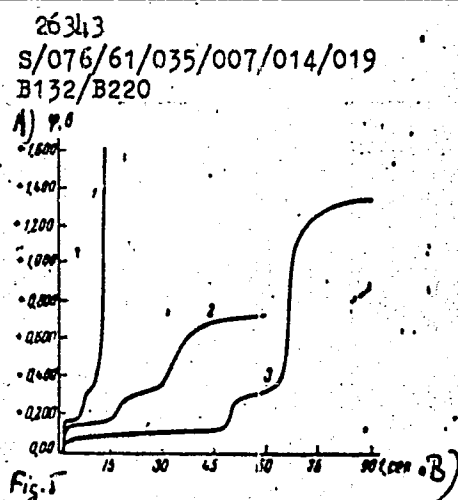
ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physico-chemical Institute imeni L. Ya. Karpov)

SUBMITTED: November 12, 1959

Card 3/5

Electrochemical behavior of nickel in ...

Fig. 5. Potential variation with time in anodic polarization of the Ni electrode by a current of $1.1 \cdot 10^{-2} \text{ a/cm}^2$ in $1\text{NH}_2\text{SO}_4$ (1), without polarization in $1\text{NH}_2\text{SO}_4 + 1.2 \cdot 10^{-2} \text{NFe}_2(\text{SO}_4)_3$ (2), and $1\text{NH}_2\text{SO}_4 + 1.8 \cdot 10^{-2} \text{NCe}(\text{SO}_4)_2$ (3). Legend: (A) ϕ , volts, (B) t, sec.



Legend to the Table: (A) Oxidizer concentration in $1\text{NH}_2\text{SO}_4$,
(B) potentials,
(C) i_0 from the polarization curves on Pt, a/cm,
(*) potentials 1 hr after starting the experiment

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21571

188300 4016, 1138, 1208

S/020/61/137/003/025/030
B101/B208

AUTHORS: Kolotyrkin, Ya. M., and Gil'man, V. A.

TITLE: Effect of chlorine ions on the electrochemical and corrosion behavior of zirconium

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 3, 1961, 642-645

TEXT: It was found in papers by E. A. Gee, L. B. Golden, W. E. Lusby (Ref. 1, see below), D. F. Taylor (Ref. 2, see below), and L. B. Golden, I. R. Lane, W. L. Acherman (Ref. 3, see below) that zirconium may be corroded by chlorine ions under certain conditions. As these papers do not permit exact conclusions on the causes of this behavior of zirconium, a more thorough investigation has now been made of the conditions, under which Zr is corroded by chlorine ions. The dependence of the dissolution rate of Zr on the potential was determined by a potentiostatic method described by the authors in Ref. 7 (ZhFKh, 30, 1990, (1956)) and Ref. 8 (DAN, 114, 1265 (1957)). The experiments were performed in 1.0; 0.1; 0.01 N HCl; 1.0 N H₂SO₄; 1.0 N KBr; 1.0 N KI. Pure zirconium (99.8%)

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B101/B208

Effect of chlorine ions on the ...

was used as electrode. The liquid reagents were purified by distillation. The solutions were saturated with N_2 which was bubbled through also during the measurement. Fig. 1 shows the result of the potentiostatic measurements. In H_2SO_4 , Zr was passive in the entire potential range

studied. In the presence of halogen compounds, however, Zr is dissolved when a critical potential φ_{cr} is attained, φ_{cr} remaining constant

irrespective of current density. The following results were obtained in galvanostatic measurements: Temporary positive and negative shifts of the potential are accomplished by increasing and reducing the current density, respectively. The potential always returns to the value φ_{cr} .

Measurement of the charge curves also indicated that at first Zr is polarized to more positive values than φ_{cr} . At a constant concentration

of Cl^- , the deviation of the potential from φ_{cr} increases with the

current density. At constant current density, the deviation increases

with decreasing Cl^- concentration. Addition of Fe^{3+} exerted the same effect as application of anodic polarization. φ_{cr} was attained at a certain

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B101/B208

Effect of chlorine ions on the ...

concentration of the iron salt. Further increase of the concentration of Fe^{3+} had no influence. It was found visually that, when φ_{or} is attained, an irregular corrosion occurs, which gives rise to the formation of pittings, which increases with the current density. With decreasing current density, the pittings are again partly passivated. This reversibility of the process is explained by the fact that at a certain density of the polarization current, the affinity of Zr to the halogen ion is greater than to the passivating oxygen. The passivating oxygen is displaced by the halogen ion. The irregular corrosion may be explained by the permanent nonuniform distribution of the plate current on the metal surface. The assumption that the corrosion process is retarded in time by the formation of primary complexes of the $\text{ZrCl}_n^{(4-n)+}$ type could not be experimentally confirmed. It may therefore be assumed that these complexes decompose by hydrolysis, the chlorine ions are again liberated, and thus act as catalysts of corrosion. Mention is made of N. A. Balashova and B. N. Kabanov (Ref. 15: DAN, 121, 126 (1958)) and L. V. Vanyukova (Ref. 14: DAN 59, 917 (1948)).

X

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Card 4/5

PETROV, N.A., red.; PETRENKO, L.I., red.; SAVITSKIY, P.S., red.; SINITSIN, V.I., red.; KOLOTYRKHIN, Ya.M., red.; SYRKUS, N.P., red.; ROMM, R.F., red.; ANIYSHEV, P.I., red.; VARTAZAROV, S.Ya., red.; ZAYTSEV, A.I., red.; ZEZYULINSKIY, V.M., red.; ZEDGINIDZE, G.A., red.; MARTYRKIN, F.F., red.; ROGACHEV, V.I., red.; SLATINSKIY, A.N., red.; LEVINA, Ye.S., vedushchiy red.; TITSKAYA, B.F., vedushchiy red.; PERSHINA, Ye.G., vedushchiy red.; IONEL', A.G., vedushchiy red.; ZARETSKAYA, A.I., vedushchiy red.; MUKHINA, E.A., tekhn.red.

[Transactions of the Conference on the Introduction of Radioactive Isotopes and Nuclear Radiation into the National Economy of the U.S.S.R.] Trudy Vsesoiuznogo soveshchaniia po vnedreniiu radioaktivnykh izotopov i iadernykh izlucheniil v narodnoe khoziaistvo SSSR. Pod red. N.A.Petrova, L.I.Petrenko i P.S.Savitskogo. Moskva, Gos.nauchno-tekhn.izd-vo neft. i gorno-toplivnoi lit-ry. Vol.1. [General aspects of isotope applications. Instruments with sources of radioactive radiation. Radiation chemistry. Chemical and petroleum refining industry]

(Continued on next card)

PETROV, N.A.---(continued) Card 2.

Obshchie voprosy primeneniia izotopov. Pribory s istochnikami radioaktivnykh izlucheni. Radiatsionnaia khimiia. Khimicheskaiia i neftepererabatyvaiushchaia promyshlennost'. 1961. 340 p. Vol.2. [Construction and the industry of construction materials. Light industry. Food industry and agriculture. Medicine] Stroitel'stvo i promyshlennost' stroitel'nykh materialov. Legkaia promyshlennost'. Pishchevaia promyshlennost' i sel'skoe khoziaistvo. Meditsina. 1961. 267 p.

(MIRA 14:4)

1. Vsesoyuznoye soveshchaniye po vnedreniyu radioaktivnykh izotopov i yadernykh izlucheni v narodnoye khozyaystvo SSSR. Riga, 1960.

(Radioisotopes)

(Radiation)

KOLOTYRKIN, Ya.M.; MEDVEDEVA, L.A.

Specific adsorption of iodine ions on silver. Dokl. AN SSSR 140
no.1:168-171 S-O '61. (MIRA 14:9)

1. Fiziko-khimicheskiy institut im. L.Ya.Karpova. Predstavleno
akademikom V.A.Karginym.
(Iodine--Isotopes) (Silver) (Adsorption)

KOLOTYRKIN, Ya.M.

Effect of anions on the kinetics of metal dissolution. Usp.khim.
31 no.3:322-335 Mr '62. (MIRA 15:3)

1. Fiziko-khimicheskiy institut imeni L.Ya.Karpova.
(Metals) (Electrochemistry)

KOLOTYRKIN, Ya.M., doktor khim.nauk; FRUMKIN, A.N., akademik

Electrochemical research in India. Vest. AN SSSR 32 no.3:56-58
Mr '62. (MIRA 15:2)

(India--Electrochemistry--Research)

KOLOTYRKIN, Ya.M.; KNYAZHEVA, V.M.

Behavior of the electrode potential of anodically passivated chromium and its iron alloys in the process of self-activation in sulfuric acid solution. Zhur. fiz. khim. 36 no.6:1232-1240 Je'62 (MIRA 17:7)

1. Fiziko-khimicheskiy institut imeni Karpova, Moskva.

35527

S/020/62/143/003/026/029
B101/B144

18. 8300

AUTHORS: Gil'man, V. A., and Kolotyarkin, Ya. M.

TITLE: Mechanism of pitting corrosion of zirconium in halide solutions .

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 3, 1962, 640 - 642

TEXT: In the previous work (DAN, 137, no. 3, 642 (1960)) it was presumed theoretically that pitting corrosion of Zr in chloride solutions was a consequence of local depassivation of the metal surface by chlorine ions. This depassivation occurs when the Cl^- concentration reaches a critical value, thus necessitating an induction period. This assumption was checked experimentally by measuring the time t_m (sec), which elapses after imposition of anodic polarization until the minimum φ_m occurs in the curve φ versus t . Results at various current densities and electrolyte concentrations are (t_m , sec):

Card 1/3

Mechanism of pitting corrosion...

S/020/62/143/003/026/029
B101/B144

	KBr			KCl		
i, a/cm ²	0.01 N	0.1 N	1.0 N	0.01 N	0.1 N	1.0 N
5·10 ⁻⁶	1200	1080	-	1410	1290	-
5·10 ⁻⁵	92.5	78.5	73.5	91	83.2	79.5
5·10 ⁻⁴	9.6	8.3	7.7	10.0	8.0	6.7

KCl + Na ₂ SO ₄		KCl + Na ₂ CO ₃	
a	b	c	d
2545	-	-	-
165	327	174	250
15.8	32.9	16.5	26

Legend: (a) 0.05 N [Cl⁻] + 0.05 N [SO₄²⁻]
 (b) 0.025 N [Cl⁻] + 0.075 N [SO₄²⁻]
 (c) 0.05 N [Cl⁻] + 0.05 N [CO₃²⁻]
 (d) 0.025 N [Cl⁻] + 0.075 N [CO₃²⁻]

With increasing halide concentration and decreasing current density the reproducibility of the data decreases. The mean deviation was in the case of 5·10⁻⁴ a/cm² and 0.01 N: 5 - 6%; of 5·10⁻⁵ - 5·10⁻⁶ a/cm² and 1.0 N: 18 - 23%. The zirconium specimens were treated with dilute HF. It is Card 2/3

Mechanism of pitting corrosion...

S/020/62/143/003/026/029
B101/B144

evident from the data that the quantity of electricity flowing through the solution from commencement of polarization to commencement of activation of the surface remains roughly constant, independent of current density. The observed deviation from this rule is explained by the occurrence of reverse diffusion of the halide ions from the metal surface into the solution at low current densities. In the case of specimens oxidized in air, φ_m coincided with the solution potential φ_{crit} , and t_m was only 1/5 - 1/30 of the t_m in the case of specimens treated with HF. This is because the solution takes place less uniformly in the presence of an oxide layer than in the case of specimens treated with HF, so that the critical concentration at the most active parts of the surface is reached sooner. There are 1 figure, 1 table, and 1 Soviet reference.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physico-chemical Institute imeni L. Ya. Karpov)

PRESENTED: December 27, 1961, by A. N. Frumkin, Academician

SUBMITTED: December 23, 1961
Card 3/3

MEDVEDEVA, L.A.; KOLOTYRKIN, Ya.M.

Effect of the pH of the solution on the adsorption of iodine ions on a silver electrode. Dokl. AN SSSR 143 no.6:1384-1387 Ap '62. (MIRA 15:4)

1. Fiziko-khimicheskiy institut im. L.Ya.Karpova. Predstavleno akademikom A.N.Frumkinym.
(Iodine) (Adsorption) (Hydrogen-ion concentration)

KOLOTYRKIN, YA.M.

"Pitting corrosion of metals."

Report submitted for the Second Intl. Congress on Corrosion of Metals
New York City 11-15 March 1963

INSTITUTE OF PHYSICAL CHEMISTRY, MOSCOW

TOMASHOV, N.D.; AL'TOVSKIY, R.M.; KOLOTYRKIN, Ya.M., doktor khim.
nauk, ~~rets~~senzant; PREOBRAZHENSKIY, A.Yu., red.;
YEVSTAF'YEVA, N.P., red. izd-va; SMIRNOVA, G.V., tekhn.red.

[Titanium corrosion and its protection] Korrozia i zashchita
titana. Moskva, Mashgiz, 1963. 167 p. (MIRA 16:7)
(Titanium--Corrosion)

S/064/63/000/001/003/007
B101/N186

AUTHORS: Kolotyrkin, Ya. M., Knyazheva, V. M.

TITLE: Experimental and theoretical bases of anodic protection for metals in aggressive media

PERIODICAL: Khimicheskaya promyshlennost', no. 1, 1963, 40 - 47

TEXT: Papers published in 1943 - 1962 on protecting against corrosion by metal passivation are reviewed. Referring to their own papers (Z. phys. Chem. 214, 264 (1960) and ZhFKh, 35, 1543 (1961)), the authors show that the redox potential φ_0 is inadequate to characterize the passivating effect of oxidizing agents. Kinetic factors were shown to play an important part, too. Protection of steel against corrosion by contact with an anodic protector is mentioned. The use of anode current making it possible to maintain a certain potential in the metal is said to be more reliable. There are 10 figures, 2 tables, and 61 references.

Card 1/1

S/064/63/000/002/001/005
B117/B186

AUTHORS: Kolotyarkin, Ya. M., Knyasheva, V. M.

TITLE: Experimental and theoretical foundations of anodic corrosion protection of metals in aggressive media

PERIODICAL: Khimicheskaya promyshlennost', no. 2, 1963, 1 - 7

TEXT: This is a continuation of an earlier paper (Khim. prom. no. 1, 40 (1963)) dealing with problems of anodic corrosion protection in practice. The applicability of anodic protection is limited to metals tending to anodic passivation and showing a certain region of optimum passivation on the corresponding potentiostatic curve. The medium should be sufficiently conducting because the object to be protected must be completely polarized by the anodic current. To avoid electrolysis of the solution which might entail a change in the composition of the medium and an increased consumption in anodic current, the working medium must be sufficiently stable or completely indifferent at the potentials applied to the object. The potential can be maintained in the optimum passivation region by three methods: (1) by applying to the object a potential from an external d-c source with stable emf; (2) by maintaining the potential of the object

Card 1/2

Experimental and theoretical foundations...

S/064/63/000/002/001/005
B117/B186

through intermittent polarization from an external d-c source; (3) by maintaining a sharply determined potential of the metal construction. This can be done by means of a potentiostat. At the present time two types are known: the electronic and electronic-mechanical type (J. Dugdale, Corrosion Technology, 8, 77 (1961); Ya. M. Kolotyrkin, I. Ye. Bryksin, G. M. Florianovich, A. N. Chemodanov, Problemy fiz. khim. (Problems of Physical Chemistry)(in press)). Examples are given of the practical use of anodic corrosion protection, taken from papers by western and Soviet authors. In conclusion the advantages of applying anodic corrosion protection are pointed out: (1) Dissolution of the material slower by 3 to 5 orders of magnitude, giving the protected object longer life as well as making it possible to use the object under rigorous conditions. Instead of high-alloy steels, less expensive low-alloy steels can be used which are easily obtained; (2) no undesirable or detrimental additions, inhibitors or oxidants have to be added to the solution; (3) the working medium is not contaminated by corrosion products; (4) metal structures in acid media and in media containing strong oxidants can be protected; (5) the principle of establishing and maintaining a constant potential with a potentiostat in anodic protection will be of great use not only in general but also in local corrosion protection. There are 7 figures and 2 tables.

Card 2/2

KOLOTYRKIN, Ya.M.; KNYAZHEVA, V.M.

Experimental and theoretical principles of the anodic protection
of metals from corrosion in aggressive media. Khim. prom. no.2:
81-87 F '63. (MIRA 16:7)

(Metals—Corrosion) (Passivation)

S/020/63/148/005/020/029
B190/B102

AUTHORS: Kolo:yrkin, Ya. M., Golovina, G. V., Florianovich, G. M.
TITLE: Depassivating action of halide ions on alloys based on iron
PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 5, 1963,
1106-1109

TEXT: In order to obtain reliable data on the pitting effect arising on Fe-Cr and Fe-Cr-Ni alloys in electrolyte solutions to which halide ions were added, all factors were investigated that affect the transition ability of these alloys from a passive into an active state due to the presence of halide ions. This ability is characterized by the activation potential ψ_a measured from either the anodic polarization curves or the variation of potential with time for constant anodic current. In the latter case ψ_a depends on the current density according to the Tafel law. ψ_a was also measured in dependence on the pH at constant halide ion concentration and on the latter at constant pH, and finally on the Cr

Card 1/3

Depassivating action of halide ions ...

S/020/63/148/005/020/029
B190/B102

and Ni contents in the alloy. These measurements were made mainly the steel of type 1X13 (1Kh13) in sulfuric acid solutions. When φ_a is plotted versus $C_{SO_4^{2-}}/C_{Hal^-}$ with constant $C_{Hal^-} = 0.01$, it may be seen that φ_a increases exponentially with increasing SO_4^{2-} concentration for both Cl^- and Br^- ions. The remaining results are to be seen from the figures. There are 4 figures.

ASSOCIATION: Fiziko-khimicheskiy institut im. L.Ya. Karpova (Physico-chemical Institute imeni L.Ya. Karpov)

PRESENTED: October 16, 1962, by V.A. Kargin, Academician

SUBMITTED: October 12, 1962

Card 2/3

Depassivating action of halide ions ...

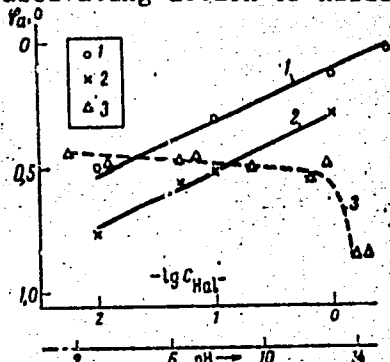


Fig. 2. η_a of 1Kh13 steel as a function of the Cl^- (1) and the Br^- (2) concentrations at pH=2 and of the pH in a 0.1 N bromide solution (3).

Card 3/3

S/020/63/148/005/020/029
B:90/B102

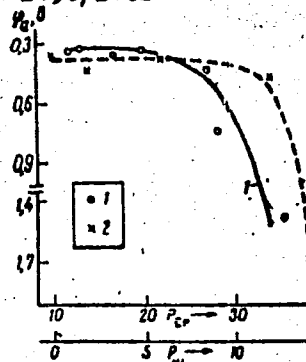


Fig. 4. η_a of Fe-Cr alloy as a function of the chromium concentration (1) and of the nickel added to the alloy X22T (Kh22T) (2) in 0.1 N chloride solution of pH 2.

FLORIANOVICH, G.M.; KOLOTYRKIN, Ya.M.

Passivation characteristics of iron-base alloys. Dokl. AN SSSR
151 no.1:144-147 J1 '63. (MIRA 16:9)

1. Fiziko-khimicheskiy institut im. L.Ya.Karpova. Predstavleno
akademikom A.N.Frumkinym.
(Iron alloys) (Passivation)

FREYMAN, L.I.; KOLOTYRKIN, Ya.M.

Pitting corrosion of iron by perchlorate ions. Dokl. AN
SSSR 153 no.4:886-888 D '63. (MIRA 17:1)

1. Fiziko-khimicheskiy institut im. L.Ya. Karpova. Pred-
stavleno akademikom V.A. Karginym.

KOLOTYRKIN, Ya. M.

"Influence of Anions on the Kinetics of Metal Dissolution."

Report presented at the 11th meeting CITCE, Intl. Comm. of Electrochemical[†]
Thermodynamics and Kinetics, Moscow, 19-25 Aug 63.

Karpov Physico-Chemical Institute, Moscow, USSR.

KOLOTYRKIN, Ya.M.

Pitting corrosion of metals. Khim.prom. no.9:678-686 S '63.

(MIRA 16:12)

KNYAZHEVA, V.M.; KOLOTYRKIN, Ya.M.; VEDENEYEVA, M.A.; RAMAZANOVA, R.S.

Use of the potentiostatic method for investigating the inter-crystalline corrosion of austenite chromium-nickel steels. Khim. prom. no.5:381-390 My '64. (MIRA 17:9)

ACCESSION NR: AP4034543

S/0020/64/155/005/1155/1158

AUTHORS: Gil'man, V. A.; Koloty*rkin, Ya. M.

TITLE: The mechanism of dissolving zirconium in acid fluoride solutions

SOURCE: AN SSSR. Doklady*, v. 155, no. 5, 1964, 1155-1158

TOPIC TAGS: zirconium, solution mechanism, dissolution kinetics, hydrogen evolution kinetics, zirconium oxidation, rate of solution

ABSTRACT: The kinetics of hydrogen evolution and the kinetics of zirconium dissolution were examined in this investigation to determine the mechanism by which zirconium is dissolved in acid fluoride solutions. Data was obtained from solutions of $0.1N H_2SO_4 + xHF$ where x is the concentration varied from 10^{-3} to $1N$. Pyrex cells were used for $[HF] \leq 10^{-2}N$ and teflon or polyethylene cells for $[HF] \geq 10^{-2}N$; equivalence of results was claimed. The zirconium electrode preparation was described previously by the authors (DAN, 137, 642 (1961); DAN, 143, 640 (1962)). Solutions were nitrogen purged although air does not affect rate. The solution rate was determined by anode current and by colorimetry using xylenol orange

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ACCESSION NR: AP4034543

APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000823930011-4"

as an indicator. The effect of mixing was studied, and authors claimed valid results for 800 to 1200 rev/min. using a 13 mm magnet in the MM-2 magnetic stirrer. Replacing the 13 mm magnet with a 20 mm magnet caused a rate increase by a factor of about 2. Solution rate was also independent of static change in potential for the -0.70 to -2.0v. range. It was concluded that the dissolving of zirconium is a two step process: the first step involving the oxidation the zirconium metal: $Zr + 2H_2O \rightarrow ZrO_2 + 2H_2$, and the second step dissolution of the oxidation product with the concomitant reaction: $ZrO_2 + nHF \rightarrow ZrF_n(OH)_{4-n} + (n-2)H_2O$. The basis for this conclusion is found in the fact that the evolution of hydrogen is independent of the electrode reaction whose rate depends only on potential. Orig. art. has: 3 figures and 4 equations.

ASSOCIATION: Fiziko-khimicheskii institut im. L. Ya. Karpova
(Physical Chemical Institute)

SUBMITTED: 27Dec63

SUB CODE: MM, GC

NR REF SOV: 003

ENCL: 00
OTHER: 006

Card 2/2

I 1967-65 INT(m)/EWA(m)/EXP(m)/EWP(m)

ACCESSION NR: AP4042213

8/0020/64/157/002/0422/0425

Antonovich, G. M.; Kolotyshin, Ya. M.

On the mechanism of dissolution of iron-chromium alloys in sulfuric acid.

SOURCE: AN SSSR. Doklady*, v. 157, no. 2, 1964, 4pp, 1 fig.

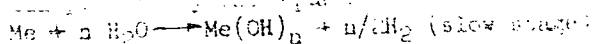
iron chromium alloy, metal corrosion, dissolution

ABSTRACT: Until recently it was considered that direct one step interaction of surface atoms of the metal with the components of the aggressive medium (chemical mechanism), which plays an important role during interaction of metals with gases and some substances is practically imperative in interaction with aqueous electrolytes. The results of recent investigations of the latter, however, resulted in reconsideration of this viewpoint. In the investigation of regularities of dissolution of iron-chromium alloys in acid solutions or electrolytes at elevated temperature phenomena were discovered which in explained require the assumption of the chemical mechanism of dissolution. The insufficient experimental data does not allow to make any definite

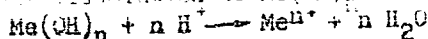
L 12973-65

ACCESSION NR: AP4042213

conclusions regarding the nature of particles which interact with metal atoms dur-



apparent dissolution of $Me(OH)_n$ in the acid



This mechanism corresponds to the results according to which the temperature

of dissolution currents of Fe-Cl alloys in H_2SO_4 near the passiva-

tion current decrease only to a certain extent with increasing temperature. This

current decrease. It is shown that the rate of dissolution may be dis-

tributed to the rate of the reaction of the metal with water, but also

to the rate of electrolysis. It follows from this study that in making a

comparison of the results of the present study with those of other authors it is also

necessary to take into account the effect of the concentration of the electrolyte from

the behavior described by the laws of electrochemistry. Specifically it is shown

that the number of water molecules which interact with the metal atoms is

to make more definite conclusions regarding the mechanism or chemical reaction it

is necessary to obtain additional data, especially on the effect of pH and anionic

composition of the dissolution process. Orig. art. has: 3 figures.

2/3

L 12973-65

ACCESSION NR: AP4042213

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karпова (Institute of Physico-

SUB CODE: MM ORG: NO REF SOV: 004

OTHER: 000

KOLOTYRKIN, Ya.M.; FLORIANOVICH, G.M.

Chemical mechanism of the dissolution of iron, chromium, and
their alloys in sulfuric acid. Zashch.met. 1 no.1:7-12 Ja-F
'65. (MIRA 18:5)

1. Nauchno-issledovatel'skiy fiziko-khimicheskiy institut imeni
Karpova, Moskva.

1-00071-55 FWT(a)/EIP(c)/EHA(d)/EWP(e)/EWP(b) IIP(f) JM/JG/AB

AP5007747

S/0364/65/001/001/0012/001.6

AUTHOR: Golovina, G. V.; Florianovich, G. M.; Kolotyarkin, Ya. M.

TITLE: Investigation of the kinetics of the initial stages of the activation of iron-chromium alloys by halide ions

SOURCE: Elektrokimiya, v. 1, no. 1, 1965, 12-16

TOPIC TAGS: iron, chromium, alloy, halogen, passivation

ABSTRACT: The process of passivation occurs slowly in time so that the relationship between the dissolution rate for the passive metal and the potential depends on the rate of change in the potential during the process of measurement: the lower the rate of change in potential the more deeply will the metal be passivated, and the lower will be the fixed dissolution rate for the metal at each given potential which is more positive than the initial one. Such a method makes it possible to follow not only the rate of passivation of the alloy but also the rate of the effect of halide ions. This method was then used to study the effect of various factors on the kinetics of the initial stages of pitting formation.

Card 1/2

L. 48971-65

ACCESSION NR: AP5007747

tion on preliminarily passivated alloys. A special oscillographic polarograph was used with the help of which anode polarization curves were taken at rates of change in the potential of the alloy from 0.01 to 64 v/sec. The satisfactory agreement of the obtained results provided confirmation of the independent occurrence of the processes of activation and passivation in the initial stages of the activation of alloys by halide ions. Orig. art. has: 7 figures, 6 equations.

ASSOCIATION: Kharko-khimicheskiy institut imeni L. Ya. Karpova (Physical-Chemical Institute)

SUBMITTED: 15 Apr 64

ENCL: 00

SUB CODE: MM, GC

NO REF SOV: 004

OTHER: 003

47
Card 2/2

FREYMAN, L.I.; KOLOTYRKIN, Ya.M.

Investigating the effect of an oxide phase film on the electro-
chemical behavior of iron and steel in a neutral solution.
Zashch.met. 1 no.1:77-83 Ja-F '65. (MIRA 18:5)

1. Nauchno-issledovatel'skiy fiziko-khimicheskiy institut imeni
Karpova.

FREYMAN, L.I.; KOLOTYRKIN, Ya.M.

Investigating the effect of anions on the passivation of
iron in neutral solutions. Zashch. met. 1 no.2:161-167
Mr-Ap '65. (MIRA 18:6)

1. Nauchno-issledovatel'skiy fiziko-khimicheskiy institut imeni
Karpova, Moskva.

J. 1204-66 E/T(m)/E/P(c)/E/NP(t)/E/NP(b)---IJP(c)---JD/MB
ACCESSION NR: AP5014131 UR/0365/65/001/003/0272/0276
620.193.2

AUTHOR: Koletyrin, Ya. M.; Kossyy, G. G.

TITLE: Influence of water on the anodic behavior of chromium in methanol solutions
of hydrochloric acid

SOURCE: Zashchita metallov, v. 1, no. 3, 1965, 272-276, and insert facing p. 274

TOPIC TAGS: solution concentration, electric potential, potentiometer, anodic re-
fining

ABSTRACT: The anodic behavior of 99.9% Cr sheets was studied in methanol solutions of HCl with additions of water. Measurements of the electrode potential were made by means of a potentiostat up to 50 mv; at room temperature, and the potential was measured relative to a saturated aqueous calomel electrode. Data were presented in the form of anodic polarization curves (potential as a function of $\lg i-a/cm^2$) for Cr in 0.1, 0.5 and 1.0 N HCl in methanol with varying additions of water, i. e., 0, 1, 2, 3, 4, 5, and 10%. Special experiments were run on 0.1 N HCl + 0.9 N LiCl solutions in which the acidity/ Cl^- -ion concentration was varied; this did not appre-

Card 1/3

L 4204-66

ACCESSION NR: AP5014131

ciably influence the kinetics of active solubility. Although adding water did not affect the regions of active solubility, adding it to the solution up to saturation changed the potentiostatic curves in the direction of more positive potentials. The activation potential was plotted as a function of H₂O concentration, for 0.1, 0.5, and 1 N HCl solutions. In all cases the potential increased with increase in H₂O concentration, the slope of the curve decreasing with higher acidity of solution. The activation of the Cr surface sometimes resulted in pitting, which vanished when the H₂O concentration was increased beyond a critical limit--3.5% for 0.1 N HCl and 9% for 1 N HCl solutions. In these cases the activation potential was displaced to the more positive side of the overpassivation potentials. Comparisons were made between cast and rolled electrodes; the anodic polarization curves in both cases were similar, while the form of the pitting attack was essentially different. Thus, for low H₂O concentrations, there were differences, while at higher H₂O concentrations pitting did not depend on the structure. Based on the experimental data, the passivation of Cr in acid solutions is related to its interaction with H₂O molecules. The first stage of this interaction is hypothesized to be the absorption of the H₂O molecule at the passivation potential leading to the displacement of Cl⁻ ions from the surface. Using this approach, the shape of the polarization curves

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L 4204-66

ACCESSION NR: AP5014131

are deduced, and the role of activation-passivization of Cr in acid solutions is explained. Orig. art. has: 3 figures.

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-khimicheskiy institut im. N. Ya. Karpova (Physicochemical Scientific Research Institute)

SUBMITTED: 19Jan65

ENCL: 00

SUB CODE: GC, MM

NO REF SOV: 009

OTHER: 000

Card 3.3 DP

FREYMAN, L.I.; KOLOTYRKIN, Ya.M.; GIVENTAL', A.Ya.

Structural corrosion and the passivation of iron. Zashch. met.
1 no.3:286-292 My-Je '65. (MIRA 18:8)

1. Nauchno-issledovatel'skiy fiziko-khimicheskiy institut imeni
L.Ya. Karpova, Moskva.

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Effect of carbon monoxide on the electrochemical behavior of
nickel and iron. Elektrokhiimiia 1 no.3:360-363 Mr '65.
(MIRA 16:12)

1. Fiziko-khimicheskiy institut imeni Karpova.

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Effect of potential on the rate of platinum dissolution in hydro-
chloric solutions. Zashch.met. 1 no.4:433-435 JI-Ag '65.
(MIRA 18:8)

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L 5218-66 EWT(m)/EPF(c)/EWA(d)/T/EMP(t)/EMP(z)/EMP(b) IJP(c) JD/WB
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 Ya. M. 44,55 44,55 44,55

TITLE: Electrochemical study of the influence of C, Ti, and Mn on the corrosion resistance of Cr-Ni-Mn steels. I. Anodic behavior 1 27 27

SOURCE: Zashchita metallov, v. 1, no. 5, 1965, 465-472

TOPIC TAGS: corrosion resistant steel, corrosion resistant alloys, passivator additive, anodic oxidation

ABSTRACT: The effect of lowering Ni content, while raising the Mn content, on the anodic behavior of 1Kh18N9T steels was studied. Further, the effects of heat-treatment, and varying C and Ti contents (Ti:C ranging from 3.9 to 6.5) were noted. Chemical composition, post heat-treatment microstructures and tendencies toward intercrystalline corrosion are tabulated for five steels of composition ranging as follows: Cr (16.3-18.4%), Ni (4.8-8.9%), Mn (trace-10.3%), Ti (trace-0.52%) and C (trace-0.13%). Only 1Kh18N9T steel exhibits a tendency to intercrystalline corro-

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sion. These steels were heat-treated by quenching in water from 1100°C, and tempering at 650°C for two hours. Anodic polarization curves (potential, ϕ vs. negative log of the current density i -amp/cm² are presented). The samples, 5 x 0.7 x 0.06 cm, were hermetically sealed in glass tubes containing 1.0 N H₂SO₄ with a nitrogen atmosphere; the measurements were made at 20 and 70°C. These cells were measured relative to normal water electrodes by means of an electronic potentiostat. These curves show that the lowering of nickel content to 5% in stainless steels of type Kh18N9 while increasing Mn content to 10%, does not influence the speed of dissolution of the steels in a wide range of potentials (from -0.05 to 1.35 volts), indicating a stable passive condition. However, the increase in Mn content leads to an increase in the critical current of passivation. In the region of secondary passivation, the speed of dissolution of Cr-Ni-Mn steels decreases with potential, which is more for steels with higher Mn content. The phenomenon appears to be associated with anodic oxidation of the Mn. The Cr-Ni-Mn steels which have the austenitic-ferritic structures are more resistant to intercrystalline corrosion. It is concluded that intercrystalline corrosion can be better controlled in steels by lowering the carbon content C, rather than depending on Ti stabilization, since in the latter case there is a shortened region of stable passivation. Orig. art. has: 4 figures, 1 table.

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L 5218-66
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Card 3/3

82. LAROV, A.T.; KOLOTYRKIN, Ya.M.

Character of the dependence of the activation energy of inhibitor
adsorption and metal ionization on the degree of surface coverage.
Zashch. met. 1 no.5:585-587 S-O '65. (MIRA 18:9)

1. Nauchno-issledovatel'skiy fiziko-khimicheskiy institut imeni
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KOLOTYRKIN, Ya.M.; MAKAROV, V.A.; KUZUB, V.S.; TSINMAN, A.I.; KUZUB, L.G.

Anodic protection of heat exchangers made of 1Kh18N9T steel in concentrated sulfuric acid at temperatures of 100 - 120°. Zashch. met. 1 no.5:598-600 S-0 '65. (MIRA 18:9)

1, Nauchno-issledovatel'skiy fiziko-khimicheskiy institut imeni L.Ya.Karpova, Moskva.

FREYMAN, L.I.; KOLOTYRKIN, Ya.M.

Effect of the acidity of the medium on the potential of iron
passivation. Zashch. met. 1 no.6:725-726 M-5 '85. (MIR 1981)
1. Nauchno-issledovatel'skiy fiziko-khimicheskiy institut imeni
I.Ye.Kirpova, Moskva.

GOLOVINA, G.V.; FLORIANOVICH, G.M.; KOLOTYRKIN, Ya.M.

Causes of the inhibiting effect of halogen ions on the dissolution
of iron and steel in sulfuric acid. Zashch. met. 2 no.1:41-45
Ja-F '66. (MIRA 19:1)

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L.Ya. Karpova, Moskva. Submitted August 31, 1965.